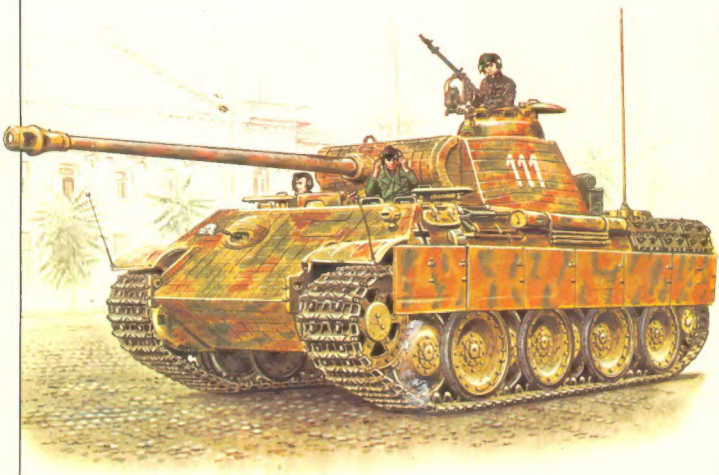
OSPREY·VANGUARD 21

The PzKpfw V PANTHER



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VANGUARD SERIES

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Panther assembly line, 1943. The turret is being guided on to its ball-race. (Martin Windrow)

Development History

When one considers oneself to be an élite force operating with the best available equipment, the sudden discovery that a hitherto despised opponent actually possesses a weapon system that is technically superior is naturally a sharp blow to one's pride and morale. Such was the situation confronting the German Panzerwaffe in 1941 following the appearance of the Russian T-34, a tank which Field-Marshal Ewald von Kleist described as being the finest in the world, and of which Maj.Gen. F. W. von Mellenthin later wrote, 'we had nothing comparable'.[1]

In November 1941 a team of designers, manufacturers and officers from the Heereswaffenamt (Army Ordnance Department) visited Guderian's 2nd Panzer Army to evaluate the T-34 and decide what measures were necessary to restore the technical balance in Germany's favour. 'The officers at the front were of the opinion that the T-34 should simply be copied, since this would be the quickest way of putting to rights the most unhappy situation of the German Panzer troops: but the designers could not agree to this. This was not primarily because of the designers' natural pride in their own inventions, but rather because it would not be possible to mass-produce essential elements of the T-34 - in particular the aluminium diesel engines – with the necessary speed. Also, so far as steel alloys went, we were at a disadvantage compared to the Russians owing to our shortage of raw materials.'[2]

Expedient solutions to the problem were found in up-grading the PzKpfw IV from its close-support rôle by replacing the 75mm L/24 howitzer with a high-velocity gun; in similarly up-gunning the Assault Artillery arm; and in accelerating development of the first generation of tank destroyers. The Tiger heavy breakthrough tank was also under development but had been designed for a specific rôle, would only become available in small numbers and was unsuitable for general issue to the Panzer divisions. (See also Vanguards 12, *Sturmartillerie and Panzerjäger*, 18, *The Panzerkampfwagen IV* and 20, *The Tiger Tanks*.) The long term answer, therefore, could lie only in the production of a new medium tank which

[1]See Vanguard 14, *The T-34 Tank*.

[2]Guderian, *Panzer Leader*.

The Panther Ausf. D's glacis incorporated a vision hatch for the driver and a hinged flap for the hull machine-gun. When both were closed it presented a smooth appearance. (Martin Windrow)

carried a more powerful weapon than the T-34, and which had a comparable armour arrangement and high-speed cross-country performance.

The Heereswaffenamt specification for the vehicle, numbered VK 3002, provided for a 75mm L/48 main armament, a weight range of 30–35 tons and a top speed of 35mph, and contracts for competitive design were let out to Daimler-Benz and MAN (Maschinenfabrik Augsburg-Nurnburg). The urgency with which the whole project was viewed can be gauged by the fact that the contracts were dated 25 November 1941, only days after the commission of enquiry's return from the Eastern Front.

The designers of both organizations were forced to incorporate a constant stream of modifications in their work, of which the most significant was the replacement of the 75mm L/48 gun with the longer L/70 which had been developed by Rheinmetall-Borsig and standardised as the KwK 42. However, the rival plans were ready by the spring of 1942 and presented a startling contrast in approach.

The Daimler-Benz entry, VK 3002(DB), was powered by a diesel engine through a rear drive sprocket and was carried on an eight-bogie interleaved suspension incorporating external leaf springs. In spite of the distinctive appearance of the running gear and the long gun, the layout of the vehicle's hull armour and its external mantlet produced an uncanny resemblance to the T-34.

On the other hand few were in any doubt as to the Germanic origins of the MAN candidate, VK 3002(MAN), which copied only the T-34's sloped glacis, laid back at the steeper angle of 35 degrees. The vehicle was powered by a Maybach HL210 petrol engine, the line of drive following the conventional path under the fighting compartment to the gearbox, whence it was transferred to the front sprockets by way of a complex final-drive mechanism. The interleaved eight-bogie suspension employed an internal torsion bar system of unusual design which increased the tank's height but gave a better cross-

country ride than other German tracked vehicles. Main armament overhang had been reduced to a minimum by siting the turret well back. Secondary armament consisted of a co-axially mounted machine gun and a hull machine gun which could be fired by raising a hinged flap in the glacis plate. Internal layout also followed the traditional German pattern, with the commander being located at the left-rear of the turret with the gunner immediately in front and the loader on the right, while the driver sat on the left of the gearbox and the hull gunner/radio operator on the right.

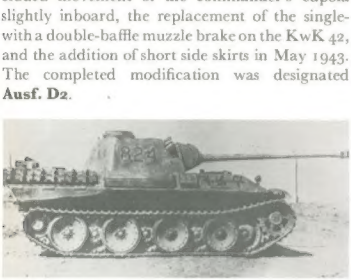
Understandably neither the Daimler-Benz nor the MAN concept went straight on to the drawing board from their respective designer's minds. Each, to a greater or lesser degree, incorporated features of the T-34, but each also drew heavily on the experience gained from the pre-war Durchbruchswagen projects and from the more recent VK 3001 contracts, thus making the VK 3002, already referred to as the Panther, a second cousin to the Tiger.[1] Of the two, Hitler preferred the Daimler-Benz candidate and indeed many feel that this vehicle held the greater development potential. The Army, however, was clearly aware that the VK 3002(DB) was *too* similar to the T-34 for recognition problems not to arise, and also disliked the main armament overhang which resulted from having the turret mounted so far forward. After trials in the autumn of 1942 the MAN design was officially accepted and the tank entered production in November as the **PzKpfw V Panther (SdKfz 171)**.

The first 20 vehicles to be built were designated Ausf. A, although they are now referred to as

[1]The DW and VK 3001 projects are discussed in Vanguard 20, *The Tiger Tanks*.

Panzer personnel enjoy a demonstration run in one of the first models built. Details of the gun have been deliberately concealed from photographers by means of a bulky jacket; the mantlet, too, is shrouded under a tarpaulin. (Martin Windrow)

Ausf. D1, their official title from early 1943. On subsequent vehicles the armour basis was increased to 80mm on the glacis and 120mm on the mantlet. This had the effect of increasing the tank's weight, already well in excess of the 35-ton target, to 45 tons, and to compensate for this the more powerful Maybach HL230 P30 engine was installed together with an AK7-200 seven-speed synchromesh gearbox. Other improvements included movement of the commander's cupola slightly inboard, the replacement of the single- with a double-baffle muzzle brake on the KwK 42, and the addition of short side skirts in May 1943. The completed modification was designated **Ausf. D2**.



An early Ausf. D fitted with the rudimentary 'drum' cupola. The photo also provides a rare example of external smoke grenade dischargers mounted on a Panther. (RAC Tank Museum)

The inevitable penalty for rushing a fighting vehicle through the design and trials stages and into production is mechanical unreliability. This the British had found with the Churchill Infantry Tank (see Vanguard 13, *The Church Tank*) and now the Panther was to give rise to similar trauma. Most of the trouble occurred in the transmission and steering linkages, where parts designed for use in a lighter vehicle were subjected to the heavier stresses imposed by a combination of increased weight and more power, and failed in consequence; but the engine itself also had a tendency to overheat, and petrol fires were common. Time was needed to get the bugs out of the vehicle and in March 1943 Guderian told Hitler that the Panther could not possibly enter active service before July. As we shall see, not only did this estimate prove to be wildly optimistic, but it also had a bearing on the eventual outcome of the war.

The second major production type was designated, for no apparent reason, **Ausf. A**, and began entering service shortly after the ill-starred Kursk offensive. The principal modifications included in this model were a much improved cupola, a ball-mounting for the hull machine gun and an increase in the number of rim bolts on the road wheels.

The last production model was the **Ausf. G**, which appeared in the spring of 1944. On this version construction had been simplified and internal space gained by fixing the upper-hull side plates at a less oblique angle, but the vehicle was more easily recognised by the absence of the driver's vision hatch in the mantlet, this being replaced by a rotating episcope in the roof of the driving compartment. In addition the driver's and operator's swinging pivot access hatches were replaced by a hinged type, the opening of which was assisted by internal springs. Late models were fitted with resilient steel road wheels and a new mantlet which avoided the downwards-deflection dangers of the earlier rounded type by being thickened at the base.

Altogether some 5,508 Panthers were built, of which 3,740 were Ausführung G. This required a major effort on the part of the German armaments industry and involved participation not only by MAN but also by Daimler-Benz and Henschel. In February 1943, as part of the rationalisation programme which was being imposed on the industry, MAN and Henschel were instructed to co-operate in achieving, as far as possible, standardisation of parts for two projected designs, the Tiger II and the Panther II. Of these only the Tiger II or Königstiger reached production, although several Panther II hull prototypes were completed and one at least was fitted with an Ausf. G turret. As envisaged, the Panther II might have been armed with an 88mm gun which entered an enlarged turret through a similar bell mantlet to that carried by the Königstiger. Had the design reached completion, the vehicle would have been known as the **Panther II Ausf. F**, Hitler having decided to abandon altogether the prefix 'PzKpfw V' in February 1944.

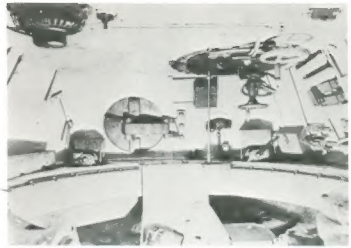
For much of its active life the Panther outranged every medium tank it engaged, although latterly the British 17pdr gun achieved parity, as did certain US tank destroyers and the Russian

T-34/85; against the Russian heavy tanks and SUs it fought at a disadvantage at the longer ranges. Nonetheless the question of up-gunning the design was never regarded with the same dire urgency as had been the case with the PzKpfw III and IV in late 1941. Some discussion did take place in 1944 concerning extension of the 75mm's calibre length to L/100, but there was general agreement that the gun's metallurgical limits had already been reached; in any event, the installation of such a weapon would have required so drastic a redesign of the turret that it could have been accommodated only with the greatest difficulty. The Allies learned of the idea during interrogation of an officer prisoner taken in Normandy, an officer evidently of some seniority, since he had been present at the discussions. There is a distinct probability that the prisoner was deliberately feeding his captor the sort of worthless information he knew would cause serious concern if believed; however, although a copy of the interrogation report was forwarded to the relevant technical branch it caused little comment, as the British too were fully aware of the limitations to gun construction.

Special-purpose Vehicles

The Panther's most famous variant was the **Jagdpanther** or Hunting Panther, a sleek tank destroyer armed with an 88mm L/71 gun which equipped the Heavy Tank Destroyer battalions during the last year of the war. Further details concerning this vehicle and its rôle can be found in Vanguard 12, *Sturmartillerie and Panzerjäger*. Various other attempts were made to use the Panther chassis as a basis for self-propelled weapon systems, but these did not proceed beyond the prototype or design model stage.

The inadequacy of vehicle recovery arrangements in the Heavy Tank battalions was only too evident in that three of the standard 18-ton Famo half-track recovery tractors were needed to tow one Tiger. Even in the medium battalions the 45-ton Panther was something of a heavyweight for its class, and two tractors were required for the job. There were numerous occasions when the



Interior of Panther Ausf. D turret, looking aft. On the right side can be seen the handwheel controlling the position of the vision-block mantlet, and beyond it the cupola hatch elevating handwheel with the position lever above it. To the left of these are the drive shaft linking the cupola counter-rotating clock scale with the turret rack; and the circular rear escape hatch. (RAC Tank Museum)

Famos simply could not cope no matter how many were brought to the task, and because of this many tanks were lost which could have been recovered by more powerful equipment.

To counter this thoroughly unsatisfactory situation the **Bergepanzer Panther** (Panther Recovery Vehicle) was developed in 1944. The vehicle consisted of a turretless hull in which the fighting compartment was enclosed by a box-like structure. Inside the compartment was a winch which drew its power from the main engine. The winch could exert a straight pull of 40 tons, and with the appropriate tackle this could be increased to 80 tons, the vehicle being held against the pull by an 8ft by 8ft 6in. ground spade which could be raised when not in use. A $1\frac{1}{2}$-ton-capacity movable derrick was also provided for the replacement of engine and transmission components. The Bergepanzer Panther had a five-man crew and was armed with a machine gun for local defence during recovery operations. A total of 297 were built; some, minus ground-spade and winch, acted as ammunition and stores carriers, in which rôle they were referred to as **Munitionspanzer Panther.**

Externally, the **Panzerbefehlswagen** (i.e. Armoured Command Vehicle) versions of the Panther differed little from the gun-tank, but could be identified by the extra antennae mounted on the turret roof and the rear of the engine deck,

The Ausf. A carried a ball-mounting for its hull machine gun. In this instance the weapon seems to have been withdrawn. (RAC Tank Museum)

the latter being of the multi-pole type. One version (SdKfz 267) was fitted with Fu 5 and Fu 7 radio sets, while the other (SdKfz 268) had Fu 5 and Fu 8 sets. In both cases the loader acted as a second operator.

A few Ausf. D vehicles were converted as **Panzerbeobachtungswagen** (Armoured Artillery Observation Vehicles), but none were encountered by 21st Army Group during the advance through Normandy and North-West Europe. It was not, in fact, until July 1945, following the discovery of a draft manual at Rheinmettal-Borsig and the interrogation of a Herr Seligman of the Anschütz organization of Kiel, that a clear picture began to emerge; it showed, beyond any reasonable doubt, that Germany had produced the best artillery forward observation vehicle of the war. The following extracts are taken from the Intelligence Report on the vehicle:

'The dummy main armament and mantlet are constructed of welded sheet metal. The gun is bolted to the mantlet which is bolted to the front of the turret. The mantlet only extends across about one-third of the turret front. The MG34 is mounted in a ball-mounting in the turret front plate to the right of the dummy main armament. It is sighted by means of the standard MG sighting telescope KFZ 2 (magnification × 1.8). The MG can be traversed five degrees left and right and has a maximum depression of −10 degrees and elevation of +15 degrees.

'The vehicle is equipped with the following optical instruments:

(a) The rangefinder Em 1.25m is located at the front of the turret and there are vision slots on either side of the turret front plates for the instrument. These slots can be closed by hinged cover plates from within the turret. The rangefinder is bolted to plates welded to the turret roof plate. The graticules on the rangefinder can be illuminated for use by night. The rangefinder is made by Zeiss.

(b) The turret observation periscope TBF 2 is mounted in the centre of the turret in a ball-mounting in the roof plate. It can be raised or lowered through $14\frac{1}{2}$in. When it is in the lowered position the opening in the roof above the periscope can be closed by a hinged cover plate. It can be traversed through 360 degrees. Two adjusting screws to the front and left of the periscope enable it to be tilted through 10 degrees. The periscope can be clamped in any required position.

(c) A TSR 1 or a scissors telescope is mounted in an adjustable bracket at the front of the commander's cupola.

'Both the commander and the observer are provided with azimuth indicators to show the amount the turret is traversed off the centre-line of the hull. An elaborate automatic plotting board made by the firm Anschütz is installed in the turret just in front of the commander's cupola. It is primarily an artillery instrument but can be used in AFVs and is intended for use in countries where maps are not available or are inadequate for artillery purposes [e.g. The Eastern Front]. The Blockstelle is used to give initial range and line to the pivot gun and to give corrections based on observation of fall of shot.'

A further development involving the Panther was the **Ground Turret**, which was encountered in Italy at both the Hitler and Gothic Lines.[1] This consisted of the standard Panther turret and its armament – less the power traverse mechanism and the cupola – mounted on top of a rectangular steel box which had been dug into the ground. The box consisted of two portions, the upper being 10ft 11in. long, 9ft $3\frac{1}{2}$in. wide and 3ft $2\frac{1}{2}$in. high, the top plate incorporating the turret ball-race and the floor a manhole located over an iron ladder leading down into the lower portion; this

The Ausf. G (left) can be distinguished from the Ausf. A (right) by the absence of the driver's vision hatch in the glacis, and by the less sharply angled hull sides. The side cylinders contain the gun's barrel scrubber, which could be broken down into several lengths for stowage. (Bundesarchiv)

conformed to the dimensions of the structure above, but was 6ft 7in. high and was divided into three compartments. One, lined with board, contained three bunks for the crew and an escape manhole; the second the main access hatch and the ladder; and the third was a storeroom for food and ammunition and also contained electric batteries and a switchbox. Electric light was provided, and fans in the roof dispersed fumes. The whole pillbox was sunk into the ground to within a foot of the top of the upper section, and the spoil was built up to the base of the Panther turret and smoothed off in a long sloping ramp. The main access started about 40 feet away and consisted of a slit trench sloping fairly sharply downward and covered at its deeper end with wooden beams and earth.

Thanks to the tremendous élan of the 1st Canadian Division and 25th Tank Brigade, the Hitler Line was stormed in a single day (see Vanguard 13, *The Churchill Tank*), but the Ground Turret had proved a most unpleasant surprise and elsewhere in Italy it took its toll. In comparison, fighting tanks was straightforward – with experience it was even possible to predict where the deadly, low-slung assault guns and Panzerjäger might be lurking in ambush; but this was different. It lay only inches above the ground, was superbly camouflaged, and opened fire only at the last minute and in the certain knowledge of a kill.

[1]Sometimes referred to, incorrectly, as the *Schmalturm* or small turret. The *Schmalturm* was an experimental short turret fitted with a coincidence rangefinder. Trials were carried out using an Ausf. G chassis.

The Panther Described

Armour

The Panther's armour was constructed of rolled homogenous plate, interlocked by step joints and welded together. Because of the Allied blockade the chromium and nickel content of the metal was low, and carbon was the principal hardening agent employed. This gave rise to difficulties in welding, the quality of which caused much adverse comment from British specialists in this field. The manner of joint welding was such as to resist external pressure, but the joints would tear apart under internal pressures such as those caused by ammunition explosions.

The sloped glacis and thick mantlet made the Panther a very difficult vehicle to knock out

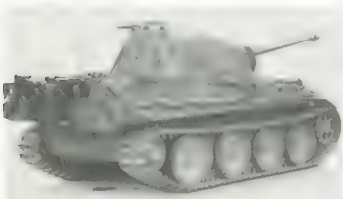
during a head-on engagement, save at close range. Andrew Wilson served as a troop leader in 141 Regiment RAC, and he recalls a conversation which took place shortly after his arrival in Normandy:

'And how does a Churchill get a Panther?'

'It creeps up on it. When it reaches close quarters, the gunner tries to bounce a shot off the underside of the Panther's gun mantlet. If he's lucky, it goes through a piece of thin armour above the driver's head.'

'Has anybody ever done it?'

'Yes. Davis in 'C' Squadron. He's back with headquarters now, trying to recover his nerve!'[1]



The Ausf. G could also be recognised by the straight lower edge of the superstructure side-plate. (RAC Tank Museum)

There was an alternative which required equally strong nerves, and this is known to have been taken by the crew of an American M36 belonging to the 899th Tank Destroyer Battalion. Realising that he was on a hiding to nothing in a straight gun-armour contest, the commander ordered his gunner to lay onto the ground immediately in front of the Panther; luckily for him it was hard and, as intended, the 90mm AP shot ricocheted up through the thinner belly plates.

Such methods are best described as unorthodox and demanded a standard of marksmanship which Daniel Boone might have regarded with envy. Understandably, there are no records as to the number of occasions on which they were tried and found wanting.

The downwards-deflection fault in the mantlet was verified, however, during firing trials carried out by the US 2nd Armored Division using 75mm Shermans and M10 tank destroyers, two penetrations of the driving compartment roof being obtained at 800 yards with APC ammunition. The APC round failed to penetrate the glacis at this range, as did the HE T105, which had been designed for use against concrete, although the HEAT round succeeded. Use of standard AP ammunition against the hull side did not result in a penetration until the range had been closed to 200 yards, but with APC the Sherman penetrated the 45mm turret side armour at 800 yards and the M10 sent a round straight through. The HEAT round was equally effective against the turret and the HE T105 blew a hole in the plating.

The 33rd Armoured Brigade also carried out firing trials with the British 17pdr and 75mm guns using APC ammunition, but concentrated on the frontal armour. At 600 yards the 17pdr penetrated the glacis without difficulty, and even bored through the mantlet to shatter the rear escape hatch. In contrast, the 75mm failed to penetrate the glacis at 150 yards, although it did gouge the armour to a depth of one inch and crack the plate before flying upwards to slice $\frac{3}{8}$in. out of the gun.

Simultaneously the 22nd Armoured Brigade was evaluating the effect of 6pdr APDS ammunition and PIAT bombs. At 300 yards 'five hits were obtained on the front plate and no 100 per cent penetration was obtained. The shot penetrated to about 50mm when it was deflected upwards making a short groove in the armour plate. It appeared that the actual projectile was too light to force its way through.' At 70 yards the PIAT failed to penetrate the glacis but did manage to get through the upper hull armour.

In general, German records confirm these findings but reveal a sensitivity regarding the vulnerability of the Panther's side armour which, as will be seen, was reflected in contemporary tactical practice.

Automotive

'The early models had a great deal of engine, clutch and gearbox trouble which was rapidly cured, but the remaining defect is the weakness of the reduction drives to the drive sprockets. These give constant trouble as they are under-tensioned for the torque they have to transmit. A Panther is regarded as being a potential mine of trouble

[1] Andrew Wilson, *Flamethrower*, Corgi, 1973

German Estimates of Panther Vulnerability

Weapon	*Area*	*Vulnerable at:*
Russian 76.2mm L/30.5	Front	400m
(T-34/76A, KV-1A, etc)	Side	1,200m
	Rear	1,200m
Russian 76.2mm L/41.5	Front	500m
(T-34/76B, KV-1C, etc)	Side	1,500m
	Rear	1,500m
Russian 85mm L/54.6	Front	600m
(T-34/85, SU-85, etc)	Side	3,500m
	Rear	3,400m
Russian 122mm	Front	900m
(JS-I, JS-II, SU-122, etc)	Side	3,500m
	Rear	3,300m
British 6pdr	Front	No penetration
(Churchill Mark IV)	Side	500m
	Rear	500m
British and American 75mm	Front	500m[1]
(Sherman, Cromwell, Churchill Mark VI)	Side	1,500m
	Rear	1,500m
British 17pdr	Front	600m
(Sherman Firefly, Comet, Achilles and	Side	2,000m
Archer TDs)	Rear	2,000m
American 90mm	Front	600m
(M26 Pershing, M36 TD)	Side	2,000m
	Rear	2,000m

The figures seem much pessimistic and may refer to penetrations made by the higher-performance APCR round of the M1 tank destroyer. Similarly, side penetration figures should be taken to refer primarily to the turret. Estimates seem to have been based on AP shot.

from 900kms onward. By 1,000kms it will probably need a 100 per cent overhaul of the drive at least. The Workshop Troop was very worried over the spares problem.'

Such was the opinion of one prisoner captured in 1944. That he was telling little less than the truth is confirmed by a Technical Intelligence Summary issued by 21st Army Group in June of that year, concerned with Panther and Tiger operational performance:[1]

'A lot has been written in recent months in praise of these two heavyweight German beasts. The following extracts from German official documents throw another light on the subject and may excite interest, if not encouragement.' The extracts are quoted here where relevant, but it is

[1]Issued by G.S.I. (Tech) 21 Army Group under ref MI 10A BM 4049. *Panthers and Tigers – A German View.*

***Bergepanzer* (armoured recovery vehicle) version of the Panther taking the strain. Army Group South sector, 1943 44. (Bundesarchiv)**

worth mentioning at the outset one passage in which it is noted by the German author that in spite of engine modifications a Panther battalion had averaged only 450 miles per tank, and that in the same period 11 complete engine units had had to be replaced. The passage ends with the recommendation that 'Panthers should not be driven over stretches greater than 62 miles as this causes much harm to the suspension, particularly in winter.' It was hardly the seal of approval for a weapon system designed for strategic employment.

The Maybach HL230 P30 engine had a cylinder capacity of 23.88 litres with a potential output of 700hp at 3,000rpm, although in service it was officially governed down to 2,500rpm. It was a V-12 motor with an aluminium cylinder block, crankcase and piston heads, although the connecting rods were made of steel; the cylinder firing sequence was 12-1-8-5-10-3-7-6-11-2-9-4.

The engine was water-cooled, two radiators being located on each side of the engine compartment, linked by a compensating tank. Through these air was drawn by twin fans driven by a two-speed gear, two-plate dry clutch, bevel gear and drive shaft from the engine, and expelled through grilles in the engine deck; some of the excess heat could be led into the fighting compartment through an air duct, giving some measure of comfort during the harsh Eastern Front winters.

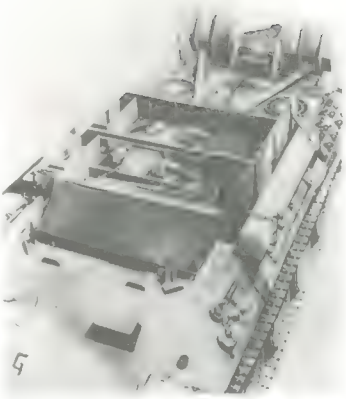
Like all German tank engines, the HL230 P30 had been designed for use in temperate climates. It was, however, installed in a very tight space and in summer the cooling system was initially unable to cope. Overheating, fuel vapourisation and engine fires resulted, leading to the installation of an automatic fire extinguisher system in the engine compartment. When the temperature rose above 120° Centigrade nozzles sprayed the fuel pumps and carburettors with a seven-second burst of extinguisher liquid. Simultaneously, a light on the driver's instrument panel warned him of the situation and he would immediately let the engine idle until it was cooler. Normal running temperature was 80° Centigrade, and it became possible to regulate this by controlling the air-flow through

the radiators by means of shutters operated from the fighting compartment.

One hundred and sixty gallons of fuel were carried (236 by the Bergepanzer version), contained in five inter-connected tanks, one against the rear wall of the engine compartment and two on each side. These were filled through a common pipe entering the rearmost tank. Fuel consumption varied between 1.40 gallons per mile during road use and 2.66 gallons per mile across country. An oil change was required every 250kms when running and thereafter every 2,000kms unless operating in dusty conditions, when a change was required every 1,000kms.

The drive passed from the engine to the three-plate dry clutch and thence to the gearbox by means of two cardan shafts between which the turret power traverse take-off was interposed in the centre of the fighting compartment. The gearbox provided synchromesh engagement for all gears save first and reverse at 2,000–2,200rpm, but double de-clutching was required over 2,500rpm or when changing down at less than 1,500rpm.

All tracked vehicles are subject to the factor



Three-quarter rear and high-angle views of the *Bergepanther*, showing the ground spade in lowered and raised positions, and the track of the winch cable. (RAC Tank Museum)

known as rolling resistance. Thus, while a wheeled vehicle will roll on with negligible loss of momentum during a gear change, a tracked vehicle's momentum falls away sharply because of the high resistance offered by the tracks themselves. In such circumstances manual gear-changing requires precise timing based on the inter-relation between the engine and vehicle speeds, and herein lies much of the tank driver's skill. Unfortunately the Panther gearbox, while technically sound, would not tolerate heavy-handed imposition of gears, particularly in the vital lower middle range, and failures reached such proportions in the early days that a circular had to be issued:

'The third gear of the Panther gearbox is the one most often in use. When changing gear it should therefore be nurtured carefully. In five out of seven cases the gearbox had to be changed because third gear could no longer be engaged. As the cog-wheels of the third gear are always in constant mesh, it is impossible to engage a higher gear.

'When travelling in second gear and it is desired to change up to third gear, the vehicle should be accelerated so that during the process of changing gear (particularly over bad ground or on a steep incline) it does not come to a halt. If insufficient time for changing gear has been allowed, i.e. if the tank does slow up, the driver should not make the mistake of trying to make up this time shortage by changing gear quickly. Changing gear too quickly overstrains both the teeth on the cogs and the synchromesh apparatus and incidentally overloads the main drive. When the going is heavy or when a steep hill has to be negotiated, it is therefore preferable to remain in third gear.'

The final drive assembly ran across the front of the vehicle and incorporated the same type of controlled differential steering that was employed in the Churchill and the Tigers, direction in this case being imposed by steering levers. In low gear the tank's turning radius was tight, becoming progressively wider as higher gears were engaged. Thus:

1st	gear	gave	a	turning	radius	of	approx.	5	metres
2nd	,,	,,	,,	,,	,,	,,	,,	11	,,
3rd	,,	,,	,,	,,	,,	,,	,,	18	,,
4th	,,	,,	,,	,,	,,	,,	,,	30	,,
5th	,,	,,	,,	,,	,,	,,	,,	43	,,
6th	,,	,,	,,	,,	,,	,,	,,	61	,,
7th	,,	,,	,,	,,	,,	,,	,,	80	,,

When the vehicle was in neutral with the engine running, strict instructions forbade application of either steering lever since this would result in the celebrated 'neutral turn' that would set the tank revolving on its own axis, with potentially fatal results on a crowded tank park. Drivers were trained to avoid steering if possible when their vehicle was climbing or traversing a slope, and advised to accelerate when steering on a downhill slope. In emergency situations the tank's track brakes could be used for steering.

As already mentioned, the Panther's suspension system was of the torsion bar type, with the difference that the bars were bent back on themselves in the manner of a hair-pin and secured to the same side of the hull as the bogie unit they were supporting. The eight bogies on each side contained a total of 16 large-diameter roadwheels, interleaved as follows:

Front	Outer	1	1	1	1		
	Middle	2	2	2	2		
	Inner	1	1	1	1		Rear

The equations in tank design are such that it is rarely possible to fulfil one requirement without creating a problem in another area. In this case the suspension and bogie systems together produced a good cross-country performance and an acceptable ground pressure, at the expense of adding inches to the vehicle's height and the inevitable compaction of mud, shingle and ice between the roadwheels, as well as a degree of inaccessibility. A special jack was provided for raising the torsion bar swing arms so that the roadwheels could be removed with greater ease. The drive sprocket centre was placed slightly higher than on the Tiger E, giving a vertical step performance of 2ft 11½in. as opposed to 2ft 7in. on the larger vehicle. The 65cm track, which contained a maximum number of 86 links, was tensioned by adjusting the position of the rear idler wheel by means of an adjusting shaft to which access was gained through a cover in the tank's tail plate. The whole arrangement looked robust and soldier-proof, but evidently it was not:

'The Panther track is correctly adjusted when the track just touches the second bogie wheel from

The Panther Panzerbefehlswagen (armoured command vehicle) was distinguished by its multi-pole antenna, although this example also carries (left) a tin command pennon on the turret. The vehicle belongs to the regimental commander of the Panzer Regiment *Grossdeutschland*, at this period Oberst Langkeit, who can be seen in his cupola receiving fresh orders from the then *Grossdeutschland* divisional commander, General Hasso von Manteuffel. (Bundesarchiv)

the front, i.e. when further tensioning would lift it off the bogie wheel. Consequently, when the final stage of the track tensioning process becomes a heavy job, negligent drivers often allow the track to remain too loose. Adjusting collars and retaining pins easily fall off, so it is essential that the driver should inspect the tracks frequently.

'The track of a Panther or Tiger sometimes slips or becomes disengaged from the teeth of the driving sprocket and jams, owing to the accumulation of undesirable matter. *The consequent tensioning of the track is so great that it is generally not possible to free the track by knocking out a track-pin.*'

The German document also mentions that one Tiger battalion had solved the problem of overtensioned tracks by cutting them with hand grenades placed beneath, and no doubt Panther crews were also familiar with the method. For use in difficult going a kit of 40 grousers was provided, to be fitted to every fifth or seventh link. When these were in place, vehicle speed was officially restricted to 9mph to avoid suspension damage.

Driving controls consisted of steering levers, accelerator, clutch, brakes, gear lever on the driver's right and handbrake on his left. Instruments included a tachometer, speedometer, oil pressure gauge and ammeter. The engine could be started electrically by means of a button on the instrument panel, but if the temperature was too low or the vehicle batteries flat a Bosch inertia starter could be used, the crank handle being inserted through the tail plate and swung by two men. This latter device seldom failed, and later production models were fitted with an improved version known as a *Durchdrehenanlasser*. A starter carburettor was also provided and could be used with either system, provided the driver did not put pressure on the accelerator simultaneously.

Gunnery and Optical

The KwK 42 75mm L/70 gun was 19ft 2½in. long, contained 32 grooves with a right-hand twist, and was fitted with a double-baffle muzzle brake. A

semi-automatic falling-block breech was employed, the weapon being fired electrically from a control incorporated in the elevating handwheel. Maximum elevation was +20° and maximum depression −8°. Like the majority of German tank guns the KwK 42 was muzzle heavy, and to compensate for this was linked to a small hydraulic cylinder located on the right of the mounting. When out of use the piece was locked horizontally in position by an internal crutch secured to the turret roof; in some cases this crutch was extended to provide a locking angle of +15° elevation. The Panther also had a hinged external barrel clamp, mounted centrally on the roof of the driving compartment, in which the gun rested horizontally during rail transists or on long road marches. The recoil cylinder was filled with a liquid known as *Bremsflussigkeit Braun* (brown buffer fluid), but in conditions of severe cold this was replaced by *Bremsflussigkeit Arktisch* (arctic buffer fluid). Later it became customary to employ an equal mixture of both liquids, the fact being recorded by stencilling *Braun Ark* on the cylinder.

A two-speed hydraulic power traverse system was provided for the turret, power being drawn from the main drive shaft through a fluid coupling. A lever on the gunner's right was pushed forward for right and pulled back for left, power being controlled by a foot pedal. The rate of turn depended on the engine speed and a trained driver would respond instinctively to the gunner's requirements. Fastest and slowest times available were:

In high ratio at 2,500rpm
one complete turn to the right – 17 seconds
In high ratio at 2,500rpm
one complete turn to the left – 18 seconds
In low ratio at 1,000rpm
one complete turn to the right – 93 seconds
In low ratio at 1,000rpm
one complete turn to the left – 92 seconds

The final lay would be made by hand, requiring the power traverse lever to be returned to the vertical position. The hand traverse was heavily geared, one turn of the wheel producing only 0.36° of movement. Some assistance was available from an auxiliary traverse handle operated by the loader through a linkage under the gun, but this facility was abandoned on later models. The auxiliary handle could be removed from its socket and hung on a bracket when not in use.

Panther ground turret, carefully sited to cover a blind bend on a mountain road. Gothic Line, Italy, 1944. (Imperial War Museum)

Two forms of sighting telescope were used, the binocular TFZ 12 on the Ausf. D and the monocular TFZ 12a on later models. Both included a range plate which rotated about its own axis, the main and co-axial armament ranges being recorded around the circumference, and a sighting plate which moved in a vertical plane and contained sighting and aim-off markings. The two plates moved simultaneously, the sighting plate rising or falling as the range plate turned. To engage at a selected range, the range wheel was turned until the required marking was opposite a pointer at the top of the sight, and the sighting mark laid onto the target by the traverse and elevation controls. Both telescopes gave a dual magnification, either ×2.5 with a 30° field or ×5 with a 15° field.

The gunner was also equipped with a two-dial turret position indicator, driven by a pinion from the turret rack and located on his left. The left-hand dial was divided 1–12 with 64 sub-divisions each of 100 mils, the right-hand dial being divided into mils with 100 sub-divisions. The indicator did have a use during semi-indirect shooting, but had originally been intended for use in conjunction with a 1 12 clock scale recorded around the inside of the commander's cupola on a toothed

anular ring. This scale worked on the counter-rotation principle. When the turret was traversed a pinion which also engaged the teeth of the turret rack drove the scale in the *opposite* direction but at the same speed, so that the figure 12 remained in constant alignment with the hull's centre line, looking directly forward. This enabled the commander to determine the bearing of his next target and inform the gunner accordingly. The gunner would then traverse onto the bearing ordered, using his turret position indicator, and find the gun approximately 'on' for line. Such a device was essential on the earliest models of the Panther, in which the commander was forced to peer through the direct-vision blocks of the rudimentary cupola. However, with the arrival of improved cupolas containing episcopes his head was naturally lower and he had a direct view of the turret position indicator, thus removing the necessity for the cupola clock scale.

The gun was fitted with a recoil indicator which showed the maximum permissible working recoil as being 430mm. A number of other safety devices were employed, which came into operation if the breech was not fully closed, the gun not fully run out or the recoil cylinder was less than full, and a protective shield was installed for the gunner and commander. Empty cases were deflected downwards into a bin beneath the breech.

The Ausf. D and A stowed 79 rounds of main armament ammunition, the Ausf. G. 82. These were housed both horizontally and vertically in conveniently sited racks and lockers around the lower half of the fighting compartment. The principal types of ammunition used by the Panther were PzGr 40, an AP round; PzGr 39 (APCBC); and Sprengrenate 43 (HE). These were fired respectively at muzzle velocities of 3,675 ft/sec, 3,068 ft/sec and 2,297 ft/sec.

Some experiments were carried out in night firing using a small infra-red projector attached to the cupola. The arrangement was obviously too vulnerable, and an alternative was tried using an indirect source of light carried by an SdKfz 251/20 half-track.

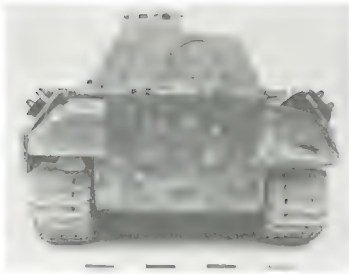
The co-axial machine gun was fired by a foot pedal operated by the gunner, a belt guide being fitted to feed the ammunition smoothly into the

Results of Anglo-American gunnery trials held with an Ausf. A, France 1944. The penetration of the mantlet immediately below the gun-sight aperture is of particular interest. (RAC Tank Museum)

German estimates of the **effectiveness of the KwK 42 75mm L/70** gun against enemy armour as at 30 May 1944:

Russian T-34	
Front	800m
Side	2,800m
Rear	2,800m
Russian KV series	
Front	600m
Side	2,000m
Rear	2,000m
Russian JS-I	
Front	600m
Side	2,000m
Rear	2,000m
British Churchill III	
Front	2,000m[1]
Side	2,000m
Rear	2,000m
US Sherman	
Front	1,000m
Side	2,800m
Rear	2,800m

[1]This is clearly a mistake in the presentation of the estimate, and the same side and rear figures could hardly apply if it was not. 800m frontal and 2,000m flank and rear penetrations are more realistic.



Tail plate of Panther Ausf. A showing access plates, left to right: left-hand idler adjusting shaft; main rear access plate; inertia starter; right-hand idler adjusting shaft. (RAC Tank Museum)

breech. The hull machine gun was breech heavy in its mounting, this being partially corrected by a compensating spring and a shaped head-piece. Some 4,200 rounds of machine gun ammunition were stowed in bags throughout the vehicle.

The early drum cupola contained six vision blocks which could be protected by a circular mantlet turned by a handwheel located under the turret roof, the mantlet sliding through 30° across the vision blocks. The improved cupola contained seven episcopes which could be lowered when not in use. The cupola hatch was circular and was mounted on a vertical shaft which could be raised or lowered by a handwheel, above which was a lever used to swing the hatch to one side when it was open. One of the problems which arose as a result of the vehicle's height and the cupola being set so far to the rear was the considerable area of visual dead ground afforded to tank-hunting parties. Looking to the right, the commander's blind spot measured 47ft 6in.; to the left 41ft; forward, 46ft; and to the rear, 38ft. The driver, too, had a 17ft blind-spot, looking directly ahead.

External smoke grenade dischargers were not carried by the Panther, but the Ausf. A and G were fitted with a single discharger in the turret roof; this had all-round traverse and was fired at an angle of 60°.

Tactics and Organization

The Panther began entering service during the period in which Col. Gen. Heinz Guderian was recalled to duty as Inspector-General of Armoured Troops. Guderian understood how tank crews thought, and was instrumental in introducing a humorous *aide memoire* for Panther crewmen, the *Pantherfibel* or Panther Primer. This was written in everyday soldier's slang and contained numerous do's and don'ts in the form of cautionary tales, easily remembered rhyming mottos and faintly salacious cartoons, the effect being to implant essential drills more easily in the mind than did the more staid official maintenance manuals. Moreover, as well as dealing with the mechanics of the tank itself, the authors respected their readers' intelligence and also included sections on AFV recognition, including the vulnerable points of enemy vehicles; tactics; and the comparative results of AP shot striking armour plate at various angles. The *Pantherfibel* is possibly the most comprehensive crew document ever produced, but is not so well known as the *Tigerfibel* and seems to have been issued in fewer numbers. Those copies which have survived are now treasured possessions.

In theory the 1943 Panzer regiment contained two battalions, each of four tank companies. One battalion was to be equipped with Panthers, the other with PzKpfw IVs. The establishment of the Army Panzer regiment was set at 51 Panthers and 52 PzKpfw IVs, and that of the SS Panzer regiment at 62 Panthers and 64 PzKpfw IVs. The SS and certain other favoured divisions may have attained these figures from time to time, but this was not the common experience. Indeed, the equipment shortage remained so serious that assault guns were supplied to replace the missing tanks, so that by 1944 most Panzer regiments contained one or two companies so armed, if not a complete battalion. Because of the limited traverse of their weapons these could not be substituted for tanks in the attack, although they could supply direct fire support.

From the middle of 1943 onwards Germany was on the defensive, the rôle of the Panzerwaffe becoming more and more that of the spearhead of the strategic counter-attack. In this context it was

The Panther's early combat experiences were far from happy. At least six litter this summer 1943 tank killing ground in the Ukraine, abandoned by their crews. On the nearest vehicle the turret pistol port-plug has been pushed out and is hanging by its chain. (Novosti)

considered 'particularly important to ensure flank protection for the "sensitive" sides of the Panther tanks. The Panzer Regiment Commander must always keep a reserve of tanks up his sleeve which he can use at a moment's notice to block any threat from the flank. This reserve should normally be about 1,100 yards to the rear. It has been found advisable to let the available PzKpfw IVs in the Panzer Regiment take over the task of protection from the flanks, while the Panthers quickly press on and drive a wedge into the enemy position.'

The experience at Kursk had also led to the adoption of new methods. Here the Panzer divisions' traditional attack formation, the *keil* or wedge, had been unable to produce the necessary volume of fire required to suppress the thick Russian anti-tank gun screens. In its place was adopted the *Panzerglocke* or 'tank bell', with the Panthers leading and the PzKpfw IVs to the right and left in a widening arc, ready to concentrate their firepower against any given area. 'The Panzer commander, together with the observers for all the heavy weapons, travelled in the *Glocke* immediately behind the leading medium tanks. He had to be in wireless communication with the commander of the fighter-bombers and other aircraft supporting the ground troops. Engineers in armoured vehicles travelled just behind the forward ranks of the *Glocke*, ready to clear gaps through minefields. An attack along these lines was generally successful if the attacking formations practised close co-operation of all weapons.

'Night attacks provided another means of breaking through deep anti-tank fronts, although a night attack was always regarded with some trepidation. The terrain had to be suitable for armour, and the weather had to be favourable; moonlit nights were preferred. The ground had to be reconnoitred during daylight by the officers concerned. As we had no suitable compasses for the tanks, a road clearly visible at night or sand tracks were used to indicate direction. Even in night attacks the *Panzerglocke* proved its usefulness; the advance was made in closer formation and with shorter distances between tanks. Darkness seriously hampered the defending guns and a well-prepared night attack usually went off without appreciable losses.'[1]

[1]Major Gen. F. W. von Mellenthin, *Panzer Battles*, Futura.

The Panther in Action

The Panther's active service career was somewhat shorter than that of other German designs, beginning in July 1943 and ending 22 months later. During that period it served on the Eastern Front, in Italy and in Western Europe.

Its first major offensive was Operation '*Zitadelle*', the attempted reduction of the huge salient which had been formed around the town of Kursk following the success of von Manstein's winter counter-offensive of February 1943, and upon this the vehicle exercised an entirely negative yet decisive influence. The German plan, drawn up by General Zeitzler, Chief of Army General Staff, and approved by Hitler, called for converging attacks by Army Groups Centre and South against respectively the northern and southern flanks which, if successful, would entrap so many divisions that the Red Army would be critically weakened. The offensive would employ the bulk of the Panzerwaffe so painstakingly rebuilt by Guderian and Speer following the Stalingrad débâcle.

The idea found little support among senior commanders. In May, von Manstein, regarded as the best operational brain in the Army and the one man capable of achieving a favourable result on the Eastern Front, commented that the plan might have worked if implemented immediately after the spring thaw, but no later. Guderian, as might be expected, was more forthright in his appraisal:

'We had only just completed the re-organization and re-equipment of our Eastern Front; if we attacked according to the plan of the Chief of General Staff we were certain to suffer heavy tank losses, which we would not be in a position to replace in 1943; on the contrary, we ought to be devoting our new tank production to the Western Front so as to have mobile reserves available for use against the Allied landing which could be expected with certainty to take place in 1944. *Furthermore, I pointed out that the Panthers, on whose performance the Chief of the Army General Staff was relying so heavily, were still suffering from the many teething troubles inherent in all new equipment and it seemed unlikely that these could all be put right in time for the launching of the attack. Speer supported these*

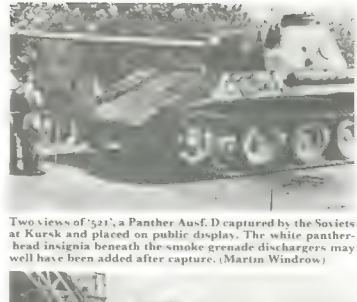
arguments of mine from the standpoint of arms production.'[1]

Since the Russians were aware of German intentions, the difficulties could only multiply. The longer the Germans waited for the Panther to become operational, the better the Russian defences became. In the end the flanks of the salient were fortified to a depth of several miles with successive defended zones, each stiff with anti-tank guns and protected by deep minefields, while most of the Russian armour was held back in the counter-attack rôle.

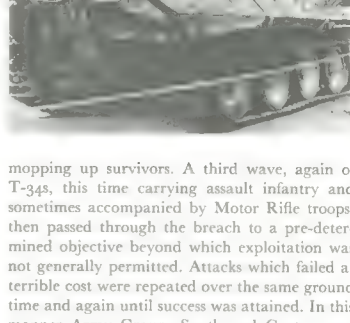
The course of the battle has already been described in several books in this series. Most of the fighting was done by Tigers, PzKpfw IVs and PzKpfw IIIs, and Guderian later recorded that his 'fears concerning the premature commitment of the Panthers were justified.' In fact, only a handful of Panthers were ever available for action at any one time. A long line of breakdowns, mainly transmission failures and engine fires, clearly marked the route from railheads to operational assembly areas, and on IV Panzer Army's sector these plus battle casualties on the first day reduced the number of Panthers available from a theoretical 200 to a mere 40. This unfortunate situation did not improve, since during the days that followed even more Panthers broke down on the field itself, beyond the scope of recovery, and were subsequently lost when the Red Army recaptured the ground which had been taken at such cost. Kursk was one of the decisive battles of the Second World War and effectively broke the power of the Panzerwaffe as a strategic arm of decision.

The opening of the Red Army's summer offensive coincided with the failure of '*Zitadelle*'. All along the front the Russians rolled ponderously forward in a series of set-piece attacks which took full advantage of their limitless manpower resources. After a heavy bombardment, an attack would be led by a wave of heavy tanks which would penetrate the German position and attempt to subdue anti-tank guns, bunkers and strongpoints in the forward areas. A second wave, consisting of T-34s accompanied by dense infantry formations, would pass through the first, completing a breach through the defended zone and

[1]Gen. Heinz Guderian, *Panzer Leader*, Futura.



Two views of '521', a Panther Ausf. D captured by the Soviets at Kursk and placed on public displays. The white panther-head insignia beneath the smoke-grenade dischargers may well have been added after capture. (Martin Windrow)



mopping up survivors. A third wave, again of T-34s, this time carrying assault infantry and sometimes accompanied by Motor Rifle troops, then passed through the breach to a pre-determined objective beyond which exploitation was not generally permitted. Attacks which failed at terrible cost were repeated over the same ground time and again until success was attained. In this manner Army Groups South and Centre were pushed steadily westwards during 1943 and the early months of 1944, retiring across the Dniepr, which Hitler had vainly declared to be the Eastern Rampart of his *Festung Europa*.

It was against this background that the ailing Panther's troubles were quickly cured, within the limitations already described, and the tank soon began to show its paces as a first class gunnery vehicle which took a startling toll of its opponents. The Panzer divisions were now employed primarily in the counter-attack rôle, the preferred method being to slice into the flank of a Russian offensive once it was fully under way. Since a

chronic shortage of tank radios prevented Russian commanders from exercising a flexible control over their armour, much reliance was placed on detailed rehearsals in which units were prepared only for their own individual part in the overall scheme. The German counterstroke, therefore, was seldom met by a co-ordinated response, and the Panthers and PzKpfw IVs were able to inflict heavier losses and cause greater confusion than they would against the more sophisticated armies of the Western Allies.

The Germans were now fighting under the terrible disadvantage of Hitler's illogical 'no withdrawal' orders. Because of these, thousands of men who would otherwise have been saved found themselves trapped by the Russian breakthroughs and were forced to surrender, while others managed to fight their way out of encircled pockets, this type of fighting being known as *Kesselschlachten* or Cauldron Battles. In these circumstances the Panzer divisions acted as *Feuerwehr* (fire brigades) along the front, moving from one crisis area to the next, either containing Russian penetrations or mounting rescue operations to relieve isolated pockets. One formation which seems to have been raised specially for this task was the Heavy Panzer Regiment (sPz Regt) Bäke, named after its commander, Oberstleutnant Dr Franz Bäke. The regiment itself consisted of one Tiger battalion with 34 tanks and one Panther battalion with 46 tanks, but also under command was an infantry battalion, a self-propelled artillery battalion and an engineer bridging battalion. In January 1944 this formation particularly distinguished itself in an action lasting five days and nights in the Balabanovka area, destroying no less than 267 Russian tanks for the loss of only one Tiger and four Panthers.

Fighting in the Ukraine continued almost without pause but rose to a peak of intensity during the Red Army's spring 1944 offensive. Having penetrated the front west of Kiev, Zhukov's 1st Ukrainian Front forced IV Panzer Army to retreat to the west and then swung south to reach the line of the Dniester, joining hands with Konev's 2nd Ukrainian Front advancing from the east. The effect of this move was to isolate I Panzer

The river bank has collapsed beneath this Ausf. A while it was engaging a target to the right; had the gun not buried itself, the vehicle might possibly have rolled. (Novosti)

Ausf. Ds and Panzer-Grenadiers undertake a road march during the first snows of the 1943 44 winter on the Eastern Front. (Bundesarchiv)

Army in a pocket at Kamenets Podolsk.

At this period I Panzer Army consisted of nine understrength Panzer divisions, one motorised and ten infantry divisions, as well as several smaller formations, including a Tiger battalion. It was commanded by Gen. Hans Valentin Hube, a former infantry officer who had been appointed to command 16th Panzer Division in 1940 and thereafter enjoyed a career of unqualified success, fighting in Russia and Sicily; he had been awarded the Knight's Cross with Oakleaves and Swords. His present appointment dated from 5 November 1943. He had foreseen what might happen and had requested OKW's permission to withdraw, sending his administrative troops out of the pocket before the noose was finally drawn tight on 25 March. An air supply system was instituted, and all non-essential vehicles were destroyed to conserve fuel.

When OKW finally gave permission to break out, Hube had two alternatives to consider. He could either go south, using a bridgehead which he still held over the Dniester at Hotin; or he could head west towards the new front which was being formed. The southern route offered the best going and would permit a withdrawal into Rumania. On the other hand, this course of action would temporarily remove I Panzer Army from the main German order of battle, since a long road-march would have to be made before it could resume its proper place in the line; it was, moreover, the obvious direction for a breakout and the one which the Russians would expect him to take. The western route was less attractive since it meant traversing broken country and involved crossing three rivers which ran from north to south into the Dniester – the Sbrucz, the Sereth and the Strypa; against this, it was the shortest route to the main German line, offered the possibility of a junction with a relief force, and was the least likely direction which the Russians would expect him to take.

After weighing the alternatives carefully against each other, Hube opted for a breakout to the west. He split his armour into three groups designated Northern Attack Force, Southern Attack Force and Rearguard, while the staff prepared route and movement schedules for the remainder of the army, much use being made of the *panje* or Russian country cart. Fighting vehicles were whitewashed and went into hides among villages, woods and orchards near their start lines. The morale of the troops was high, partly because they had been briefed as to the form of the breakout, and partly because they had fought their way out of a similar if slightly less dangerous situation the previous month. An elaborate deception plan, based on vehicle movements and false radio traffic, was set in motion to convince the Russians

that the breakout would be made to the south. II SS Panzer Corps, 125 miles away at Tarnopol, was ordered to drive east and effect a junction with I Panzer Army, while the Luftwaffe prepared to land further supplies of fuel and ammunition inside the pocket as it moved west.

The breakout took place on the night of 27/28 March under cover of a blizzard which concealed the scale of the movement. The two Attack Forces, led by Panther battalions, found no difficulty in breaking through the thin Russian screens, and during the 28th secured crossings of the Sbruez and advanced on the Sereth.

It took the Russians some time to work out what had happened and some of their units were actually sent south on a wild goose chase, under the impression that the Germans had escaped in that direction. However, when the Northern Attack Force reached the Sereth on 29 March the German intention was clear and the 4th Tank Army was ordered to cross the Dniester and advance into the German flank between the Sbrucz and the Sereth. This counter-move was met by the Southern Attack Force and roughly handled, while the crossing of the Sereth continued.

The Russians now began moving armour from north and south across the path of I Panzer Army, as well as attacking the rearguard, which contained most of the Tigers. On 1 April the weather, which until now had favoured Hube and his men, began to turn against them. First a three-day blizzard made movement difficult for friend and foe alike, and then a sudden thaw turned the hard-frozen ground into the sort of quagmire in which the Russian armour performed to better advantage than the German. Progress became slower, with the embattled pocket making only a few miles' headway to the west each day. Vehicles began to break down and were pushed off the road after their precious fuel had been siphoned off.

On the other hand, Hube was now in radio contact with II SS Panzer Corps, approaching from the west, and the Luftwaffe continued to deliver supplies and evacuate the wounded – the latter a most important morale consideration, since no German soldier wished to become a prisoner of the Red Army.

Slowly the gap between the two Panzer formations closed until the Strypa was reached and crossed by both Attack Forces on 15 April. The following day contact was made with the spearheads of II SS Panzer Corps near Buczacz. A few days' scrappy fighting remained while the Rearguard came in, but I Panzer Army was home and immediately resumed its place in the line.

Even against the colossal setting of the Eastern Front, involving millions of men and thousands of fighting vehicles, the achievements of Hube's army were among the most spectacular of the war, for as well as fighting its way to freedom it had destroyed no less than 357 Russian tanks and 42 SUs. Hube was immediately promoted to Colonel-General, and on 20 April was awarded the Diamonds to his Knight's Cross, one of only 27 such awards made during the Second World War. He was killed the next day when the aircraft in which he was travelling to receive the decoration crashed at Obersalzburg.

For the Army this was a double tragedy, since Hube might have replaced the brilliant von Manstein as Commander of Army Group South; it was, in fact, Manstein's firm insistance that I Panzer Army be permitted to break out that led directly to his dismissal by Hitler. Unfortunately, in spite of having total command of his armed forces, Hitler was no longer capable of controlling events, the course of which was now being dictated by STAVKA. Again, it was obvious to most senior officers that with most of the German armour concentrated at the southern end of the front the next major Russian offensive would be made against the less well equipped Army Group Centre. The Army Group commander proposed a limited withdrawal so that the initial fury of the assault would spend itself in empty space and thus be vulnerable to counter-attack, but Hitler would have none of it; there would be no withdrawals of any kind. The result was that Operation '*Bagration*', involving four Soviet Fronts, virtually destroyed Army Group Centre in July 1944, smashing through the defences with a wave of armour which rolled on deep into Poland. The effect of this was the strategic isolation of Army Group North in the Baltic provinces, many units having to be evacuated by sea.

Defeat was now inevitable despite the desperate sword-and-shield tactics practised respectively by the Panzer divisions and the Sturmartillerie. But

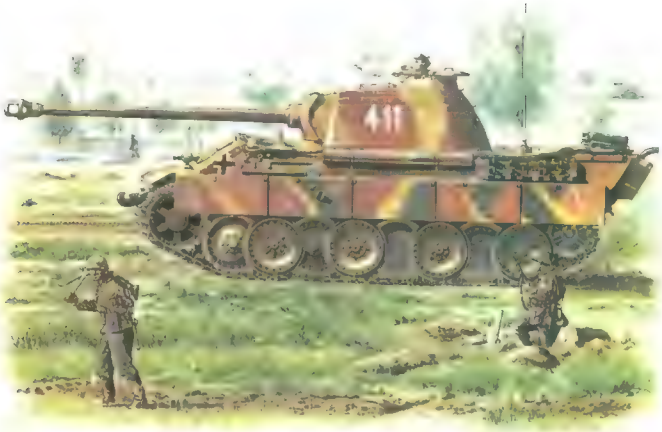
1. PzKpfw V Ausf.D, SS Panther Brigade; Kursk, July 1943

2. PzKpfw V Ausf.A, unit unknown; Russia, winter 1943-44

1. PzKpfw V Ausf.A command tank, Pz-Rgt. 'Grossdeutschland'; Russia, January 1944

2. PzKpfw V Ausf.A/G, 3.SS-Pz-Div. 'Totenkopf'; Poland, April 1944

1. PzKpfw V Ausf.G, 5.SS-Pz-Div. 'Wiking'; Poland, April 1944



2. PzKpfw V Ausf.A, 5.SS-Pz-Div. 'Wiking'; Poland, April 1944

1. PzKpfw V Ausf.D command tank, probably 16.Pz-Div.; Italy, summer 1944

2. PzKpfw V Ausf.G, Pz-Rgt.31, 5.Pz-Div.; Russia, 1944

1. PzKpfw V Ausf.G, 1.SS-Pz-Div. 'Leibstandarte Adolf Hitler'; Paris, 1944

2. PzKpfw V Ausf.A command tank, 1.SS-Pz-Div 'Leibstandarte Adolf Hitler'; Normandy, 1944

1. PzKpfw V Ausf.G, probably 9.SS-Pz-Div. 'Hohenstaufen'; France, 1944

2. PzKpfw V Ausf.G command tank, unit unknown; France, late 1944

1 PzKpfw V Ausf.G, 4th Coldstream Guards, 6th Gds. Tank Bde.; Low Countries, winter 1944-45

2. 'M10 tank destroyer', Panzer-Brigade 150; Ardennes, December 1944

1. SS-Rottenführer, SS-Pz-Rgt.5 'Wiking'; Russia, 1944
2. Leutnant, 16.Panzer-Division; Italy, summer 1944

3. Oberstleutnant, Pz-Rgt. 'Grossdeutschland'; Eastern Front, 1944
4. Crewman, SS-Pz-Rgt.1 'Leibstandarte Adolf Hitler'; France, 1944

the Red Army paid a terrible price for every mile it gained, its reliance on brute force and numbers being accompanied by a callous disregard for the human and material loss incurred; in such circumstances even single German vehicles could not fail to take advantage of the Russians' clumsiness, as did one Panther of I/Pz Regt 35 of 4th Panzer Division in September 1944, following a counter-attack near Riga to recapture a piece of commanding ground:

'Hill 920 is now firmly in our hands. Among the tanks which have taken part in its capture is that commanded by Sergeant Christ, the crew being Rehard, gunner Mehling, loader – Gietl, driver and Faustmann, operator.

'The vehicle has already been giving trouble for some time, so Christ obtains permission to retire down the slope and examine the damage. The driver diagnoses an oil leak and comments that the steering gear is defective; the tank is no longer battle-worthy and will have to go into workshops for heavy repairs.

'The commander reports the situation and they begin their interminable wait. Russian fighters and bombers fly over and bombs explode all round. The crew are used to this and remain in the vehicle. Only Christ observes. Suddenly he hears the sound of tanks on his right. The matter begins to interest him, for although he cannot see through the distant belt of trees, of one thing he is certain – whatever it is over there, it can only be Ivan. He dismounts and walks over to the nearby Grenadiers. They tell him that for some time they have been observing a Russian T-43 in the wood opposite. [T-43 was 'German' for the M43 T-34/76 up-armoured to 110mm and fitted with a cupola.] Cautiously Christ crawls through the dense undergrowth until he can see two T-43s, concealed under the trees at the edge of the wood. Quickly he summons Rehard, the gunner, and shows him the target while their sick tank is painfully manoeuvred into a favourable firing position.

'The first Russian is now engaged. At the second shot the crew bail out but the vehicle does not catch fire. The second T-43 now becomes the target and bursts into flames at once. Simultaneously Christ observes the muzzle flashes of two further Soviet tanks. Their shots, however, are directed elsewhere. Rehard swings the turret from left to right and two further rounds set both vehicles ablaze. It seems as though the four tanks are only an advance guard, and the German vehicle reverses back from its exposed position.

'The Sergeant observes closely through his binoculars. He perceives that near the first pair of knocked-out vehicles two further T-43s have arrived and that their barrels are pointing towards him. Now that the Russians know where their enemy is, things are beginning to look unpleasant.

'Once more the tank which should be in workshops moves forward. Gietl nurses it into a firing position. Rehard lays onto the first Russian and the gun blasts out at him. The man is the very devil of a gunner and hits with the first round. With a violent explosion the tank is blown apart. So much for Number Five! Next the first T-43 to be hit tries to escape – he too is pounced upon and this time burns like a torch.

'The ammunition is expended. Two men from the crew quickly run to a nearby lorry and begin throwing off tank ammunition. Christ can hardly believe his eyes – two more tanks have appeared and are firing from a position to the right of their burning comrades. Unfortunately he can only twiddle his thumbs until the ammunition arrives. But the bad moment does not last long and soon Number Six is blazing.

'The ammunition supply fails again as yet another T-43 comes into view, but the two crewmen have already dismounted and are running up with fresh rounds. The Russian is hit as he pokes his nose forward from cover. Number Seven is set on fire with the first shot.

'The Russians avoid this 'windy corner' and go elsewhere. The Panzer-Grenadiers breathe again. Through the gathering darkness Christ and his crew are towed in their crippled vehicle towards the workshops.'[1]

There were many such incidents during the last few months of the Eastern Front's existence; but courage, skill and the will to keep the hated Russians out of the German homeland could not rectify the terrible mistakes which had been made, nor could they hope to prevail against such impossible odds.

In the West the Panther battalions also took a

[1]Translated from *So Lebten Und So Starben Sie*, published by the Kameradschaft ehem. Panzer Regiment 33.

'Crews front!' for the 1st (Panther) Battalion of Panzer Lehr Regiment 130. Hungary, March 1944. (ECP Armées)

heavy toll of their opponents when fighting defensively, the British and American armies calculating that four or five Cromwells or Shermans were needed to kill one Panther. Nonetheless, there were few occasions in the history of the Panzerwaffe when it was forced to fight under such manifold difficulties.

As in the East, the German commanders in Normandy were hamstrung by Hitler's uncompromising 'no withdrawal' order. This kept their troops within range of the heavy volume of naval gunfire which could be produced by the Allied navies, and also exposed them to concentrated artillery fire used with a flexibility unknown on the Eastern Front. Swarms of ground-attack aircraft hovered over the lines ready to pounce on any fighting vehicle whose camouflage was less than perfect, so that all movement had to be made by night and fire positions carefully chosen for their concealment value. Fuel, ammunition and spares had to travel long distances over routes of which the Allied air forces had total control during the day and which were increasingly disrupted by the FFI during the night. Few replacement vehicles reached the front, so that while the Allies were consistently suffering heavier tank losses, sheer attrition bled the Panzer divisions white.

There were also occasions when it was necessary for the German armour to go over to the offensive. Much has been made of the difficulties imposed by the close *bocage* on the Allied armour, but the German tankmen were similarly inhibited; indeed, in the small hedge-lined fields they lost the benefit of their superior armour and armament and were at the mercy of the less powerful Allied tank and anti-tank guns, as well as short-range weapons such as the PIAT and bazooka.

With the exception of the encounter battle at Villers-Bocage on 13 June 1944, when sSS PzAbt 101 and 2nd Panzer Division halted a potentially dangerous penetration by the British 7th Armoured Division (see Vanguard 20, *The Tiger Tanks*), the majority of counter-attacks foundered

because of the controlled response of the Allied armies. For example, of the attempt to pinch out the salient secured by Lieut.Gen. Sir Richard O'Connor's VIII Corps during Operation 'Epsom', SS-Obergruppenführer Paul Hausser, commander of II SS Panzer Corps, commented that 'the murderous fire from naval guns in the Channel and the terrible British artillery destroyed the bulk of our attacking force in its assembly area. The few tanks that did manage to go forward were easily stopped by the British anti-tank guns.' The sheer intensity of the defensive barrages also meant that in many cases those tanks which did manage to get forward lost the protection afforded by their Grenadier escorts in close country. 'In only three hours, up to 8,000 incoming shells were counted in one regimental sector alone. All attack attempts by Panzer-Grenadiers were foiled by well-placed enemy barrages, involving at least one artillery brigade on each objective. The barrages included all calibres, including large naval guns from offshore warships, with mortar batteries thickening the fire coverage in confined areas. On Panzer-Grenadier Regiment 19's sector, incoming shells were so dense that craters were one or two paces from each other. Enemy artillery fire was directed undisturbed by aerial observers in light observation aircraft, under complete enemy air superiority.'

Elsewhere, German fortunes were mixed. On 11 July an attempt to cut the American beachhead in two with a night attack led by the Panthers of the Panzer Lehr Division was foiled in close-quarter fighting with a tank destroyer battalion (see Vanguard 10, *Allied Tank Destroyers*). However, on 18 July a drive by three British armoured divisions east of Caen, Operation 'Goodwood' was halted decisively by the defensive gunfire of I SS Panzer Corps.

A week later the US Army broke out into open country and commenced a wide turning movement around the Germans' southern flank. Hitler's response was characteristic in that his solution was drawn from the map and ignored the

The Panther battalion of the SS-Panzer-Regiment *Wiking* evidently sprayed their vehicles according to a unit pattern. The 5th SS-Panzer Division *Wiking* suffered severely during the Red Army's spring 1944 offensive against Army Group South. (Bundesarchiv)

A pleasant study of a Panther harbour area, summer 1944, Eastern Front. (Bundesarchiv)

operational realities of the situation. Gode named Operation '*Liege*', a counter-attack would be made at Mortain, smashing through to the sea at Avranches with eight Panzer divisions and thus isolating those American formations which had broken out. By stripping the front of its last reserves of armour, much of which had to travel down from the British sector, elements of just four Panzer divisions were scraped together into a task force which would operate under the command of Gen. Hans von Funck's 47th Panzer Corps. Only 185 tanks and assault guns, or rather more than the nominal strength of a single division, were available, and of the tanks approximately half were Panthers.

'*Liege*' opened during the early hours of 7 August, and some penetrations were made under cover of bad flying weather which kept the Allied air forces grounded. However, as the morning wore on this cleared and the RAF's 2nd Tactical Air Force and the 9th US Air Force went into action immediately, bombing, strafing and rocketing the long columns to a standstill, so providing a rare example of air power being used successfully to halt a ground offensive. Nor was American morale unequal to the occasion, as Hitler had prophesied; the US VII Corps swiftly mounted a counter-attack which drove into the German flank, while units which had been overrun formed perimeters and fought back fiercely until relieved. By evening battle casualties and breakdowns had dramatically reduced Funck's tank strength by more than 50 per cent and '*Liege*' was effectively over, although Hitler refused to recognise the fact for several days.

Inexorably, the Germans' southern flank was bent back on itself while British and Canadian pressure from the north began forming a pocket based on the town of Falaise. Inside the shrinking perimeter of this pocket were the remnants of 15 divisions, including nine of the 11 Panzer divisions in the West, plus stragglers from other formations,

Ausf. A in almost mint condition, Hungary 1944. By now, many units were adding additional protection to the vulnerable hull and turret sides in the form of spare track links. (Bundesarchiv)

a total of 100,000 men. II SS Panzer Corps made its way out of the trap and then fought fiercely to keep an escape route open, with only limited success. After days of being shelled from all sides and attacked ceaselessly from the air, those who remained in the pocket finally surrendered on 22 August. Some 10,000 men had been killed in the Falaise cauldron and 50,000 were taken prisoner; some 500 tanks, assault guns and self-propelled artillery weapons had been destroyed or abandoned. The disaster ranked second only to that of Stalingrad.

As the Allies followed up the German withdrawal from France, their suspicions concerning the Panther's unreliability were confirmed by the number of broken-down examples which they found abandoned by the roadside. If, as the intelligence document already quoted suggested, the discovery showed the vehicle in a new light, it was appreciated most at the higher levels; to the regimental soldier the Panther remained an extremely dangerous opponent to the bitter end.

The Wehrmacht's recovery after the trauma of Normandy was as rapid as it was remarkable, divisions which had been reduced to mere skeletons of their former selves being re-equipped with unbelievable speed. In September II SS Panzer Corps savaged the British 1st Airborne Division at Arnhem, while elsewhere throughout the autumn determined resistance at Aachen and Geilenkirchen brought the long American advance to a halt on the frontier of Germany. At Meijel a battlegroup consisting of 9th Panzer Division, 15th Panzer-Grenadier Division and a Parachute division forced the over-extended US 7th Armored Division into a local withdrawal, and caused such concern that a major redeployment of Allied reserves was necessary.

The reconstituted Panzer formations were Germany's last viable armoured reserve and Hitler

In Italy the German armour fought a defensive battle which, of necessity, involved local counter-attacks at critical points. (Bundesarchiv)

planned to use them for a concentrated thrust through the Ardennes, across the Meuse and on to Antwerp, thus cutting the Anglo-American armies in two. This, he hoped, would bring about a stalemate in the West and convince the Russians that Germany could not be defeated. The plan was wildly impractical: the comment of the pragmatic von Rundstedt, recently recalled as Commander-in-Chief West, was 'This damn thing hasn't got a leg to stand on!' Three armies were detailed for the task, 6th SS Panzer on the right, 5th Panzer in the centre and 7th on the left.

The offensive, subsequently known as the Battle of the Bulge, began on 16 December. 6th SS Panzer Army was stalled by the impenetrable American defence of Butgenbach and the Elsenborn ridge, while its advance guard, the infamous Battlegroup Peiper, failed to capture vital petrol supplies, became trapped in the tortuous Ambleve valley, and was eventually forced to abandon its vehicles and escape on foot. 5th Panzer Army achieved a deep penetration, isolating Bastogne, and continued towards the Meuse. On Christmas Day the German spearhead, 2nd Panzer Division, was halted by the British 29th Armoured Brigade east of Dinant, and then assailed from the north by the US 2nd Armored Division; in two days of fighting 2nd Panzer lost the majority of the 88 tanks with which it had begun the offensive. The Bulge had been contained and would now contract steadily.

During the fighting the Panther remained the most powerful medium tank on either side, but was present in insufficient numbers to balance the overall Allied superiority. Hamstrung by a chronic fuel shortage, it was forced to operate in rolling, wooded country which favoured the defence and which had few suitable roads, subject after the first few days to constant Allied air attack. From the outset, the battle could not have been won.

After his failure in the Ardennes Hitler withdrew most of his armour from the West and sent it to Hungary in a vain attempt to safeguard the Reich's last remaining source of fuel oil. With the Red Army poised on the eastern frontier of Germany itself the decision was catastrophic in its effects, simply hastening the inevitable end.

* * *

In the opinion of the majority of armour experts, the Panther was the best German medium tank design of the war – *with reservations*. In the main, these reservations concern the vehicle's automotive performance and stem directly from its hasty conception and design. It would not, for example, have been possible to carry out great armoured drives in the manner of 1940–41 with Panther as the principal weapon of the Panzer divisions, since the mechanical failure rate would have been too high to maintain the mass of the spearhead and loss of momentum must inevitably have resulted.

The world into which the Panther was born was,

Extracts from the *Pantherfibel* – top to bottom: pp. 30/31, engagement of moving targets using aim-off marks on sighting plate; pp. 48/49, radio layout, and advice to operator; and pp. 70/71, engine water and air cooling systems. (Courtesy Oberst aD. Helmut Ritgen)

Panthers breaking cover during a counter-attack, Italy, 1944. They are probably tanks of 16.Panzer-Division. (Bundesarchiv)

however, very different from that of 1940–41, more emphasis being placed on firepower and protection than on long-range mobility by an army which was now fighting a defensive war. In this context the Panther's performance was infinitely superior to that of its stable-mate, the 75mm L/48 PzKpfw IV, although the latter's mechanical stamina was greater. Together, these two factors produced a reputation among the Allies that was second only to that of the Tiger.

The Plates

A1: PzKpfw V Panther Ausf. D, SS Panther Brigade; Kursk, Russia, July 1943

This tank is finished in the overall factory yellow paint scheme ordered for all German armour from February 1943; the dark green and brown camouflage paint was diluted from paste concentrates and applied at unit level, in this case in a soft sprayed mottle. Note that it covers the extra track plates stowed along the sides of the hull and turret. Interestingly, the tank number '201' – presumably indicating the command tank of the 2nd Coy. of the Brigade – is painted on the turret track plates rather than the turret wall, in a white outline style. No other markings are visible in photographs of these vehicles. The crew wear the Waffen-SS one-piece mottled camouflage overalls.

A2: PzKpfw V Panther Ausf. A, unit unknown; Russia, winter 1943–44

The use of the three-quarter-length hooded field grey parka and overtrousers by the crewmen seen in photographs of this vehicle indicates that it belonged to a Waffen-SS unit; this clothing was Waffen-SS issue but was not normally worn by Army personnel. The factory yellow finish is almost entirely covered in winter whitewash camouflage, with the suspension, gun and gun-

crutch left uncamouflaged. A rectangle of yellow is left exposed as backing for the turret numbers '511' – lead tank, 1st Platoon, 5th Company.

B1: PzKpfw V Panther Ausf. A command tank, Panzer-Regiment 'Grossdeutschland'; South Ukraine, January 1944

This tank was commanded by the regimental CO, Oberst Willy Langkeit, who is seen in the turret; in the photo from which we take this view the standing officer in the left foreground, Oberst Karl Lorenz, has been incorrectly identified as its commander. The factory yellow finish is completely covered with winter whitewash. A faded

Long guns present a problem when descending a steep slope. If the muzzle strikes the ground at the bottom the mounting may sustain serious damage so, as in this case, the gunner applies elevation until level going is reached. The vehicle is an Ausf. D, probably belonging to 16.Panzer-Division, which served in Italy in 1943. (Martin Windrow)

national cross emblem is painted on the forward corners of the hull sides, the usual position on Panthers. The turret marking is interesting: a small black divisional emblem – the 'GD' Division's *Stahlhelm* and a black 'O'. Another photo of Langkeit's Panther taken a few weeks later shows a three-colour camouflage, and the number '01' – see lower detail view. Note *Zimmerit* anti-magnetic plaster in the characteristic pattern in which it was applied to the PzKpfw V.

B2: PzKpfw V Panther Ausf. A/G, 3.SS-Pz-Div. 'Totenkopf'; Kovel, Poland, April 1944

This appears to be a composite produced by marrying an Ausf. A hull with an Ausf. G turret; this kind of expedient was not uncommon, as vehicles sent to the rear for major repairs would often be brought up to the latest standards. The softly mottled camouflage is conventional in colour and application; again, note *Zimmerit* pattern. The white turret number appears to identify lead tank, 1st Platoon (Zug), 1st Company. More unusual is the application of a divisional emblem; these were rarely seen on Panthers, but photos show the 'Totenkopf' death's-head clearly marked on the left of the glacis, as viewed. Another photo in this sequence shows a Panther from the rear; the left rear hull stowage bin bears the national cross centrally, and the death's-head low at the left.

C1: PzKpfw V Panther Ausf. G, 5.SS-Pz-Div. 'Wiking'; Kovel, Poland, April 1944

A well-known sequence of photos indicates that at this time the application of the green and brown camouflage paints to the yellow factory finish followed distinct company patterns in the 'Wiking' Division's Panther battalion. This 4th Coy. tank has hard-edged patches of colour, particularly

Panther battalion moving into the line, Italy, 1944. The scant camouflage and regular parking indicate a freedom from Allied air activity unknown in France. The tanks belong to Panzer-Regiment 26 of 26.Panzer-Division. (Bundesarchiv)

striking on the skirt plates. Markings are conventional.

C2: PzKpfw V Panther Ausf. A, 5.SS-Pz-Div. 'Wiking'; Kovel, Poland, April 1944
A contrasting scheme displayed by a 6th Coy. Panther at the same period, with roughly cross-hatched brush-strokes of green and brown. These are applied over the national cross on the hull and over the turret numbers '635' – for clarity we have in fact made both these markings more noticeable than they appear in the original photos.

D1: PzKpfw V Panther Ausf. D command tank, probably 16. Panzer-Division; Italy, summer 1944
This tank sports plain factory yellow over *Zimmerit* finish, and markings are limited to the national cross and the turret numbers. Several photos were taken of this tank, and the marking has been interpreted elsewhere as an Arabic 'one' followed by '02'. Closer study in fact reveals it to be the 'I' of a 1st Battalion headquarters tank. Our tentative identification of the division is based simply on the very limited numbers of units equipped with Panthers in this theatre, and the apparent date.

D2: PzKpfw V Panther Ausf. G, Pz-Rgt. 31, 5.Pz-Div.; central Russia, 1944
Interestingly, this tank has no *Zimmerit* coating. A soft, indistinct mottle of green and brown is applied over factory yellow. Ahead of the turret number '135' in white there appears to be an application of this regiment's famous 'red devil' emblem – it was most unusual to see elaborate unit insignia painted on armour at this date, however.

E1: PzKpfw V Panther Ausf. G, 1.SS-Pz-Div. 'Leibstandarte Adolf Hitler'; Paris, spring 1944
An interesting variation on normal camouflage patterns is displayed by this 'LSSAH' vehicle

In contrast, total camouflage was mandatory in Normandy and North-West Europe, even when travelling by rail. (Bundesarchiv)

This crew have made effective use of evergreen and deciduous boughs to break up the outline of their vehicle and mask its hard texture. Evergreen was easier to use and lasted longer, but could look oddly out of place if used alone. On the other hand deciduous camouflage had to be replaced as soon as the leaves died back, although it looked more natural. The grenadiers have a fresh, spruce look which suggests a lift into, rather than out of, action. France, September 1944. (Bundesarchiv)

passing through Paris shortly before the Normandy invasion. Green and brown are applied in a kind of 'leopard spot' pattern over factory yellow and *Zimmerit*. No markings are visible apart from the national cross. In close country such as France tanks of both Allied and German units commonly wrapped the gun barrel in chicken-wire as a basis for foliage or scrim camouflage, to obscure the outline of that part of the tank which was most visible above hedgerows and walls.

E2: PzKpfw V Panther Ausf. A command tank, 1.SS-Pz-Div. 'Leibstandarte Adolf Hitler'; Normandy, summer 1944

This tank has been variously identified; close study of photos gives a clear divisional identification, however the device 'LSSAH' is scratched deeply into the *Zimmerit* on the side and rear quarter of the turret. The 'R02' on the turret rear and the skirt plates, in the red and white more usual earlier in the war, identifies the regimental deputy command tank within regimental headquarters. The interesting insignia on the turret has also been variously interpreted; colours are necessarily estimated, but the comparison of tones in the original photograph leads us to believe it was in yellow and black. The derivation of the panther and the SS-style lightning bolt are obvious: the circle may represent either a gunsight or a tank sprocket. The camouflage finish is conventional.

F1: PzKpfw V Panther Ausf. G, probably II/SS-P:-Rgt. 9 'Hohenstaufen'; France, summer 1944

Typical example of one of the survivors of the holocaust around Falaise during the retreat across France. There is heavy external stowage; and foliage camouflage was a normal precaution, under skies ruled by Allied fighter-bombers – as was an 'aircraft sentry' on duty at all times. Fairly

hard-edged stripes of green and brown are painted over the factory yellow. The turret marking is unclear: other numerals apart from the '6' may be painted on the rear turret face but hidden by the hatch. The white disc on the latter is unexplained. Note spare road wheels; and iron strapping cradles for jerrycans on inner faces of rear stowage bins.

F2: PzKpfw V Panther Ausf. G command tank, unit unknown; France, late 1944

An example, from photographs, of the so-called 'ambush' camouflage applied to a Panther, here a regimental headquarters vehicle. The effect of dappled sunlight in woodland was skilfully duplicated: this scheme was apparently most commonly seen on Königstigers and on various Panzerjägers.

G1: PzKpfw V Panther Ausf. G, 4th Armoured Bn. Coldstream Guards, 6th Guards Tank Brigade; Low Countries, winter 1944–45

This captured Panther was photographed on several occasions, notably in action alongside Churchills of 'A' Sqn. of this battalion in the Maastricht area, January 1945. 'Cuckoo' is painted in yellow on the base of each turret side, and a naturally prominent Allied recognition star is painted to almost full turret height. The factory yellow scheme is overpainted with whitewash. Photos also show it without whitewash, with '153' hand-painted white on the right-rear stowage bin.

G2: 'M10 tank destroyer', Panzer-Brigade 150; Ardennes, December 1945

An elaborate system for identifying fake US Army vehicles used by Otto Skorzeny's unit included the marking of 'XX' or 'XY' on the glacis, between the codes of 'B' Coy., 10th Tank Bn., 5th Armored Division. Vehicles were supposed to travel with turrets traversed left; and a ludicrously complex system of flashlight signals, gestures, and even coloured scarves and unbuttoned parts of the tunic betrayed a sad ignorance of winter combat conditions. The ruse did not deceive anyone for

Right, an Ausf. G in a hurry passes two Panthers halted at the roadside, France, September 1944. The manned AA mounting and the towing hawser, shackled ready for use, epitomise the Panther's experience during the retreat from Normandy. (Bundesarchiv)

The effect of an HE T105 anti-concrete round when fired at close range at the glacis of a Panther Ausf. A. (RAC Tank Museum)

long; the Panther/M10s 'B-4', 'B-5', 'B-7' and 'B-10' did not long survive their entry into combat outside Malmedy. See plans on the opposite page for further details of construction and marking positions.

H1: SS-Rottenführer, SS-Pz-Rgt. 5 'Wiking'; Russia, 1944

This junior tank crew NCO displays the black vehicle uniform with certain regimental peculiarities. The standard Waffen-SS black Panzer sidecap bears the silver-grey eagle and swastika and the silver-grey skull of that organization, with an inverted 'V' of Panzer-branch pink *soutache* or 'Russia braid'. The crossover Panzer tunic is piped pink on the upper part of the collar, unusually for this late in the war; and, peculiarly to this regiment, the collar patches are piped pink as well. They bear SS runes on his right side and a rank device – two double bars of braid – on his left. Shoulder and left sleeve insignia are of conventional SS type: the sleeve eagle worn by all ranks, the divisional cuff title, and the chevrons of rank. Decorations are the Panzer Assault Badge, and the 'Frozen Meat Order', indicating service in Russia in winter 1941–42 – presumably as an infantryman, since this tank unit was not raised until 1942–43. Grey-green working trousers are worn.

H2: Leutnant, 26.Panzer-Division; Italy, 1944

German troops in Italy habitually wore both European and African issue uniforms, often in combination. This Panther commander, taken from the same photo as the tank in Plate D1, is an example. His tropical field cap is of faded olive, with silver piping of commissioned rank round the crown-seam and in the 'scoop' of the false turn-up, a silver eagle on tan (see detail), and the usual Army cockade in black, silver and red; a 'V' of Panzer pink branch piping is worn. The short-sleeved tropical shirt has had added the breast eagle of the field grey service tunic, in silver on black. Rank shoulder straps are buttoned and looped to the shoulders. The service belt, headset and laryngophones are all standard issue.

H3: Oberstleutnant, Panzer-Regiment 'Grossdeutschland'; Eastern Front, 1944

From a photograph of a youthful and dashing lieutenant-colonel of the 'GD' Division's tank regiment. The black *Einheitsfeldmütze*, which began to replace the sidecap of Panzer troops in 1943, bears silver officer's crown piping and silver insignia; it is the two-button type. The black crossover tunic, of post-1943 style, lacks pink collar piping, but the death's-head collar patches worn by all Army Panzer ranks are still pink-piped. The tunic is worn, at personal taste, over a roll-neck sweater. The pink-backed shoulder straps of a field officer bear the gold 'pips' of this rank, and the gold 'GD' monogram worn by officers of the division. The divisional cuff title is in silver on black.

H4: Panther crewman, SS-Panzer-Regiment 1 'Leibstandarte Adolf Hitler'; Paris, spring 1944

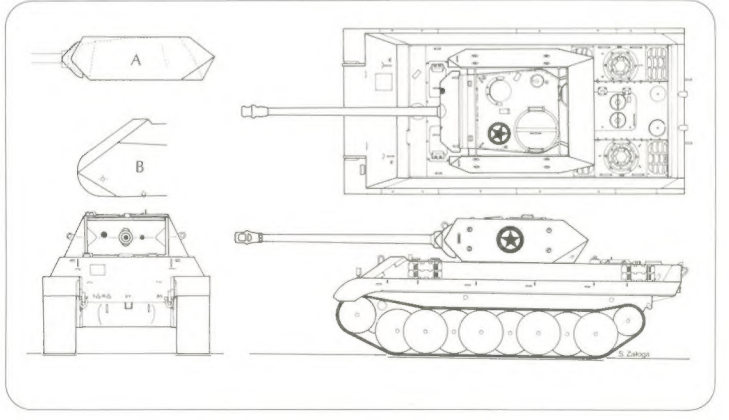
From the same photographs on which we base Plate E1. The black sidecap continued in use alongside the peaked field cap in the latter stages of the war, and bears standard SS insignia. The one-piece overall is an example of the many outfits made up for German personnel out of stocks of Italian Army camouflage material.

The PzKpfw V Panther

BASIC TECHNICAL DETAILS

	Ausf. D	Ausf. A	Ausf. G
Weight:	43 tons	45.5 tons	44.8 tons
Armour:	80mm glacis 120mm turret front		
Speed:	34mph (road) 19mph (cross-country)		
Overall length:	29ft 1in.		
Width:	10ft 10in.		
Height:	9ft 8in.	10ft 2in.	10ft 2in.

Four Panthers Ausf. G were converted into fake 'M10 tank destroyers' for use by Otto Skorzeny's American-uniformed 'Panzer-Brigade 150' during the Battle of the Bulge. Thin metal plates disguised the turret and mantlet (A), and a false bow was added (B), with the glacis machine gun covered by a simple hatch on a chain. Narrower side-skirts were added, and the cupola was replaced by a simple split hatch. The unit went into action to secure the right flank of *Kampfgruppe Peiper's* deep thrust towards Stavelot; moving west along the Malmedy-Stavelot road on the morning of 21 December 1944, they met stiff resistance from Company 'K', US 120th Infantry. Private Francis Currey won the Congressional Medal of Honor for knocking one out with a bazooka, and attacking the others with rifle grenades and small arms fire with such effect that the crews baled out, and were pinned down. The Panthers were destroyed when reinforcements brought up heavier weapons. (Steven J. Zaloga)



Notes sur les planches en couleur

A1 Couleurs de camouflage normalisées depuis février 1943: peinture jaune appliquée à l'usine, avec vert et marron ajoutés par les unités individuelles, à motif varié. Remarquez que le camouflage est continué sur les articulations des chenilles transportées sur la coque et de chaque côté de la tourelle. **A2** Un camouflage simple d'hiver, au badigeon blanc, recouvre presque entièrement la peinture d'usine jaune, avec un espace laissé exposé pour inscrire le numéro sur la tourelle. Les uniformes de l'équipage indiquent une unité SS.

B1 Char du commandant du régiment, Colonel Willy Langkeit. La vue de détail du haut montre les inscriptions sur la tourelle en plus grand, qui comprennent l'emblème 'casque' de la division *'GD'*. La vue de détail du bas montre une autre inscription, visible sur des photos de la Panther de Langkeit quelques mois plus tard. **B2** Combinaisons de couleurs de camouflage conventionelles. L'utilisation de l'emblème divisionnaire était peu courant vers la fin de la guerre. Il se répète, à la gauche d'un Balkenkreuz national, sur le coffre d'arrimage à l'arrière gauche de la coque.

C1 Des schémas différents de camouflage étaient utilisés par chaque compagnie du bataillon Panther de la division *Wiking*; ce char de la 3ème compagnie est recouvert de taches de trois couleurs à contours bien délimités. **C2** Ce tank de la 6ème compagnie est recouvert de peinture appliquée à coup de brosse en croisé, qui dissimulent partiellement les inscriptions.

D1 Peinture jaune d'usine, avec les inscriptions du char du commandant en seconde du 1er Battaillon sur la tourelle. **D2** Il était peu courant de voir des inscriptions d'unité sur la tourelle d'un tank à n'importe quel moment, et tout particulièrement vers la fin de la guerre, mais ce régiment était tout spécialement attaché à son emblème de 'diable'.

E1 Peinture de camouflage inusitée, en forme de taches de léopard; remarquez l'absence d'inscriptions. **E2** Il est possible que l'emblème sur la tourelle, qui représente une panthère et un éclair, soit particulier à ce char; notez les lettres 'LSSAH' grattées dans le revêtement en plâtre au côté et à l'arrière de la tourelle. Les lettres 'R02' nous permettent d'identifier le tank du commandant en seconde du régiment.

F1 Un rescapé du massacre de Normandie fuyant à travers la France. Des branches touffues étaient souvent utilisées en tant que camouflage contre les nombreux avions alliés. Remarquez le grand nombre d'équipement et de pièces de rechange transportés, et le 'berceau' pour les bidons de pétrole sur les coffres d'arrimage à l'arrière de la coque. **F2** Le soi-disant 'camouflage d'embuscade' que l'on trouvait fin 1944/début 1945 sur certains chars allemands, porté ici par un char de l'Etat Major du régiment.

G1 Panther capturé par cette unité blindée de la Garde britannique, près de Maastrich, en janvier 1945; remarquez la grande étoile des alliés, pour faciliter l'identification. Le nom du tank, 'Cuckoo' (le coucou) est peut être une allusion aux habitudes de cet oiseau, qui va pondre dans un nid 'étranger'. **G2** L'un de quatre prétendu véhicules 'anti-char' M10 utilisés par l'unité de Otto Skorzeny pendant la bataille des Ardennes. Voir les plans ailleurs dans ce livre. La ruse fut éventée, et tous furent rapidement détruits.

H1 Uniforme réglementaire d'équipage de tank, mais la ganse rose autour des écussons de col est spéciale au régiment. **H2** Mélange d'uniformes tropicaux et européens, fréquemment trouvés en Italie. **H3** Emblèmes à monogrames spéciaux de la division *'GD'* sur les épaulettes, et brassard de manches de la division, visibles sur cet uniforme 'Panzer' réglementaire datant de la fin de la guerre. Le pull-over à col roulé était souvent portés par temps froid. **H4** Exemple du type des combinaisons d'équipage de tank faites à partir de tissu de camouflage des surplus de l'armée italienne.

Farbtafeln

A1 Das normale Tarnungschema vom Februar 1943: gelbe Farbe wie ab Fabrik, unter Beifügung von verschiedenen Mustern in grün und braun durch die einzelnen Einheiten. Bemerke die fortgesetzte Tarnung über die Kettenglieder, die am Rumpf und den Turmseiten getragen werden; und das Aufmalen der Nr. '201'-Kommandopanzer, 2.Kompanie - über die Kettenglieder am Turm. **A2** Eine sorgfältige Wintertarnung aus weisser Tünche ist über dem grössten Teil der fabrikgelben Farbe aufgetragen, mit einer Aussparung für die Turmnummermarkierung. Die Mannschaftsuniform lässt wahrscheinlich eine SS-Einheit erkennen.

B1 Der Panzer des Regimentskommandeurs, Oberst Willy Langkeit; der obere detaillierte Ausschnitt zeigt eine Vergrösserung der Turmmarkierung, das 'Helm' Abzeichen der 'GD' Division beinhaltend. Der untere detaillierte Ausschnitt zeigt eine andere Markierungsmöglichkeit, wie auf Bildern des Langkeits Panther einige Monate später gezeigt. **B2** Herkömmliches Tarnungschema. Der Gebrauch des Divisionsabzeichens ist ungewöhnlich so spät im Krieg. Es wurde wiederholt, links vom nationalen Balkenkreuz, am Staubehälter auf dem linken hinteren Rumpf.

C1 Verschiedene Tarnungsmuster waren von jeder Kompanie der 'Wiking' Divisions, Panther Battalion benutzt; dieser Panzer der 3. Kompanie hat scharfkantige Flächen der drei Farben. **C2** Dieser Panzer der 6. Kompanie hat überall kreuzweis-schraffierte Pinselstriche, teilweise die Markierungen verdeckend.

D1 Einfache gelbe Farbe wie ab Fabrik mit der Turmmarkierung des Panzers des stellvertretenden Kommandeurs des 1. Battalions. **D2** Es ist immer ungewöhnlich eine Einheitsmarkierung auf dem Turm eines deutschen Panzers zu sehen, besonders so spät im Krieg; dieses Regiment hing jedoch sehr an ihrem 'Teufels' Abzeichen.

E1 Ungewöhnliches 'Leopardenflecken' Tarnungsschema; bemerke das Nichtvorhandensein von Markierungen. **E2** Ein gewöhnlicheres Tarnungsschema, jedoch mit ungewöhnlichen Markierungen. Das Turmabzeichen eines Panthers und eines Blitzstrahles mögen Eigenheiten dieses einen Panzers gewesen sein; und bemerke 'LSSAH' eingekratzt in den aufgetragenen Putz auf der Turmseite und hinten. 'R02' lässt den Panzer des stellvertretenden Regimentskommandeurs erkennen.

F1 Ein Überlebender der Massenvernichtung in der Normandie, auf dem Rückzug durch Frankreich. Schweres Laubwerk wurde oft als Tarnung gegen die schwärmenden Kriegsflugzeuge der Alliierten getragen. Bemerke die grosse Anzahl der verstauten Ausrüstung und Ersatzteile, die mitgetragen wurden, und die 'Wiegen' für die Benzinbehälter auf den Staubehältern am hinteren Rumpf. **F2** Das sogenannte 'Hinterhalt-Tarnungsschema', beobachtet an einigen deutschen Panzern spät 1944/anfangs 1945, hier getragen von einem Panzer des Regiments-Hauptquartiers.

G1 Erbeuteter Panther benutzt von dieser Panzereinheit der britischen Garde in der Nähe von Maatricht, im Janvar 1945; bemeske die grosse Stern-Markierung der Alliierten zur schnellen Erkennung. Der Name 'Cuckoo' (Kuckuck) deutet wahrscheinlich auf die Gewohnheit des Vogels, in einem fremden Nest aufzuwachen. **G2** Einer der vier gefälschten 'M10 Panzerzerstörer' Fahzeuge, von Otto Skorzeny's Einheit, in den Ardennenkämpfen benutzt. Siehe auch Pläne anderswo in diesem Buch. Die List war erfolglos und alle waren bald zerstört.

H1 Herkömmliche Panzermannschaftsuniform, regimentale Eigenarten waren jedoch die rosafarbene Paspelierung um die Kragenabzeichen, sowie rosafarbene Kragenpaspelierung zu solch einem späten Zeitpunkt. **H2** Eine Mischung von tropischen und europäischen Uniformstücken, wie häufig in Italien gesehen. **H3** Besondere 'GD' Divisionsmonogramabzeichen auf den Schulterklappen und ein divisionales Ärmelaufschlagband, an der gewöhnlichen Spätkriegs-Panzeruniform. Rollkragenpullover wurden oft bei kaltem Wetter getragen. **H4** Ein Beispiel der Panzermannschaftsanzüge, entnommen den Fotos, auf denen wir Zeichnung E1 basierten, die von überschüssigem Tarnungsmaterial der italienischen Armee hergestellt wurden.

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Avec annotations en français sur les planches en couleur

Mit Aufzeichnungen auf deutsch über die Farbtafeln

1. **British 7th Armoured Division**
2. **Panzer-Grenadier Division 'Grossdeutschland'**
3. **US 1st Infantry Division**
4. **Fallschirmpanzerdivision 'Hermann Göring'**
5. **US 101st Airborne Division**
6. **The Lee/Grant Tanks in British Service**
7. **2nd SS Panzer Division 'Das Reich'**
8. **US 1st Marine Division**
9. **British Guards Armoured Division**
10. **Allied Tank Destroyers**
11. **US 2nd Armored Division**
12. **Sturmartillerie and Panzerjäger**
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